THE EXCAVATION OF WESTFIELD (R11/898), SOUTH AUCKLAND

LOUISE FUREY

AUCKLAND

Abstract. The excavation of R11/898, Westfield, in South Auckland is described. The site, interpreted as an undefended settlement, was excavated in response to development. Postholes, a pit and evidence of cooking was uncovered, along with a number of artefacts of various types. It is suggested that although the main occupation of the site in the 16th century was of short duration, the settlement was not intended to be of a temporary nature.

The excavation of part of R11/898 (grid reference R11 750 735) was a salvage project authorised by Historic Places Trust (1981/51) and carried out prior to the construction of the Maui gas pipeline through the area. The site, formerly identified as N42/941, has been named Westfield for ease of identification. It was one of the few relatively undisturbed open settlement sites remaining in the Auckland urban area. A full report of the excavation is presented in Furey (MS). Field notes, photographs, artefacts and materials recovered are held in the Auckland Museum.

THE SETTING

Situated in the Tamaki-Otahuhu area of Auckland, the site is adjacent to the western side of the Southern Motorway, near what is known locally as 'Tip Top Corner' (Fig.1). The landscape would in the past have been dominated by two major volcanic cones within one kilometre of the site: Otahuhu (Mt Richmond) R11/13, and Te Apunga-o-tainui (McLennan Hills) R11/10, were both Maori pa. Te Apunga-o-tainui, which had extensive earthworks near the summit, has been totally destroyed by quarrying for basalt. The volcanic lava fields (Flatrock) to the east of Te Apunga-o-tainui and bordering the Tamaki River, have several open settlement sites, not unlike R11/898 from surface features, and evidence of garden systems (Sullivan 1972:153). Hamlins Hill (R11/142), a large hill to the north-west of R11/898, also an open settlement site, has had the lower knoll progressively excavated over a number of years. This hill however is on the edge of the volcanic soils and is composed of Waitemata sediments overlaid by a thin deposit of volcanic ash (Walton 1979:115).

Red and brown volcanic loam soils are present over the wider area. These soils were fertile and free draining and well suited to the growing of kumara.

The Tamaki-Otahuhu area is a narrow strip of land between the Tamaki River and the Manukau Harbour and was an important focal point in pre-European times, allowing easy access between the east and west coasts. Several portages or crossing

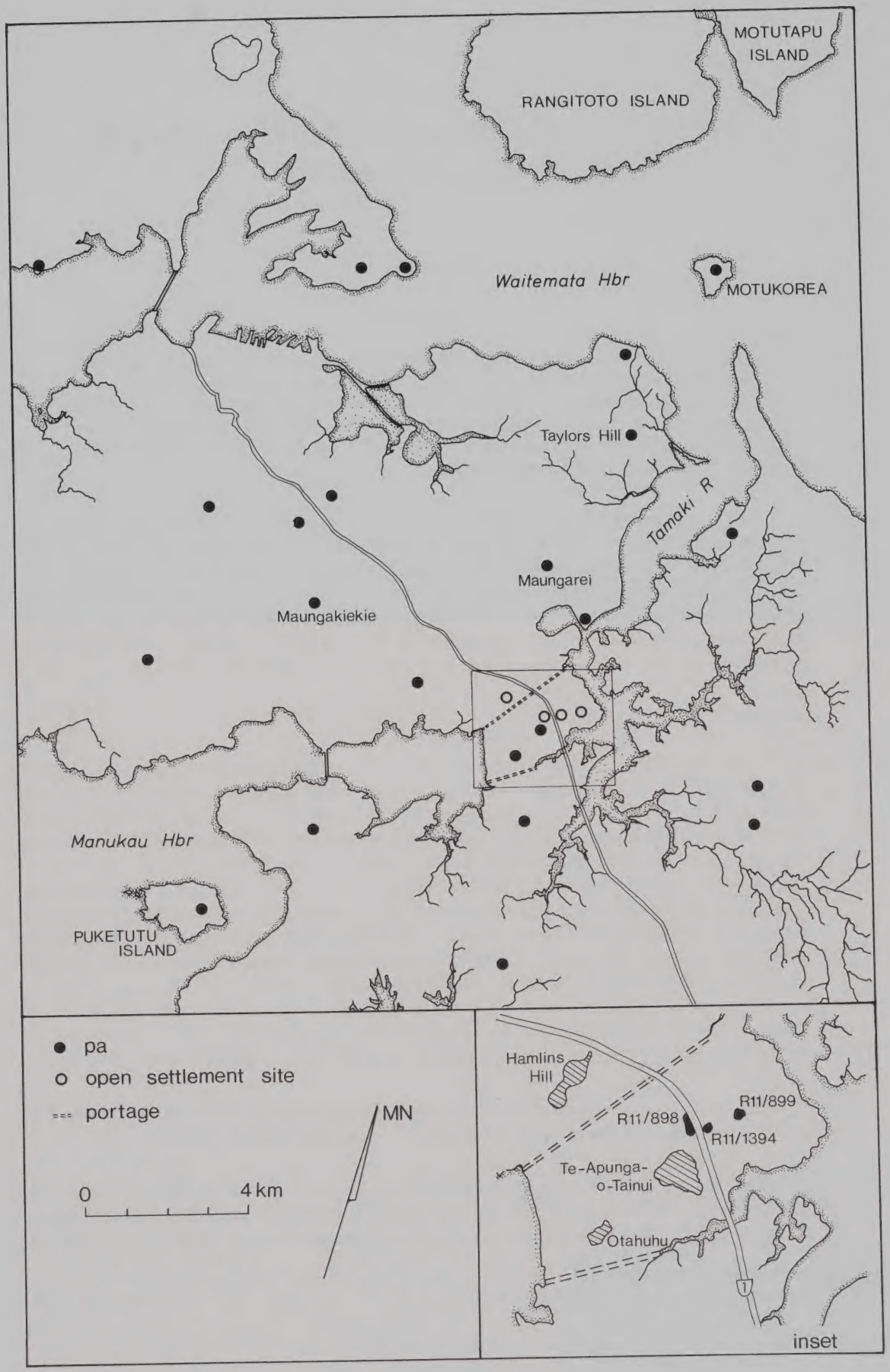


Fig.1. Location map of R11/898, Westfield.

places are known. Te Toangakiotahuhu or Otahuhu (Simmons 1980:32) was one kilometre long and crossed from the head of the Otahuhu Creek to the Manukau Harbour. A second portage, Karetu, two kilometres long, followed a route from Anns Creek across the base of Hamlins Hill to the Tamaki River (Brown 1954:174).

The site (R11/898) is on a low hill approximately 200 metres long with a height of about five metres above the surrounding flat land. The hill was present before Te Apunga-o-Tainui erupted, during which basalt lava breached the volcano's tuff ring and flowed away to the north and east, stopping at the Tamaki River (Searle 1981:125). Lava covered the hill in an irregular fashion, following the underlying ground configurations. The lava was subsequently covered with ash thrown out of Otahuhu (Searle 1981:131). Over time erosion has left rocky high points and steeper slopes exposed, with redeposition of ash in the hollows and at the base of the slope.

Surface features on the site consisted of shell midden protruding through the grass, several terraces and two pit depressions near the southeastern end (Fig.2). Early aerial photographs (1940) show the southeastern end extended further to the east (pictured in Searle 1981:132). However this toe was truncated by motorway development. Shell midden exposed through the vegetation adjacent to the motorway indicates some cultural material was disturbed during construction work. A house has been situated on the hill, disturbing the central area of the site.

The Maui pipeline easement was to affect only the easternmost end of the site. The area to be excavated consisted of three vague terraces on the southeast facing slope. Shell midden was visible below the uppermost terrace. A level surface was present above the slope.

THE EXCAVATION

The excavation strategy was to intersect both the flat area at the top of the slope and the terraces. A strip 4.5 m wide and 25 m long was initially excavated with adjacent areas being opened up as excavations progressed. A total of 244 m^2 was excavated over seven weeks from October to December 1981.

The recording system was based on a continuous grid, similar to the co-ordinate method used on maps where the 'origin' is in the southwest corner. Artefacts and samples could be located precisely within the overall recording grid.

The excavations were termed Areas 1-6, partly indicating the sequence in which work progressed and providing for rapid broad-level relocation.

Area 1, and the adjacent Area 6, were on the level surface at the top of the slope (Fig.3). Areas 2, 3, 3/East and 4 were situated over the three terraces descending down the slope. Area 5 was on the eastern side of Area 2, and Area 2/West on the western side. Both were excavated to investigate the areal extent of the shell midden.

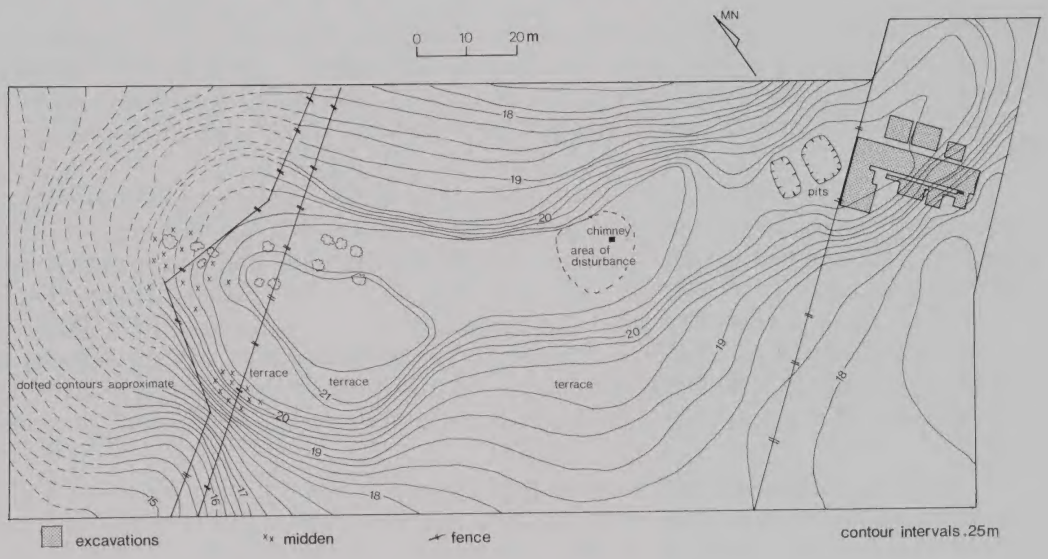


Fig.2. Contour map of R11/898, showing the excavations.

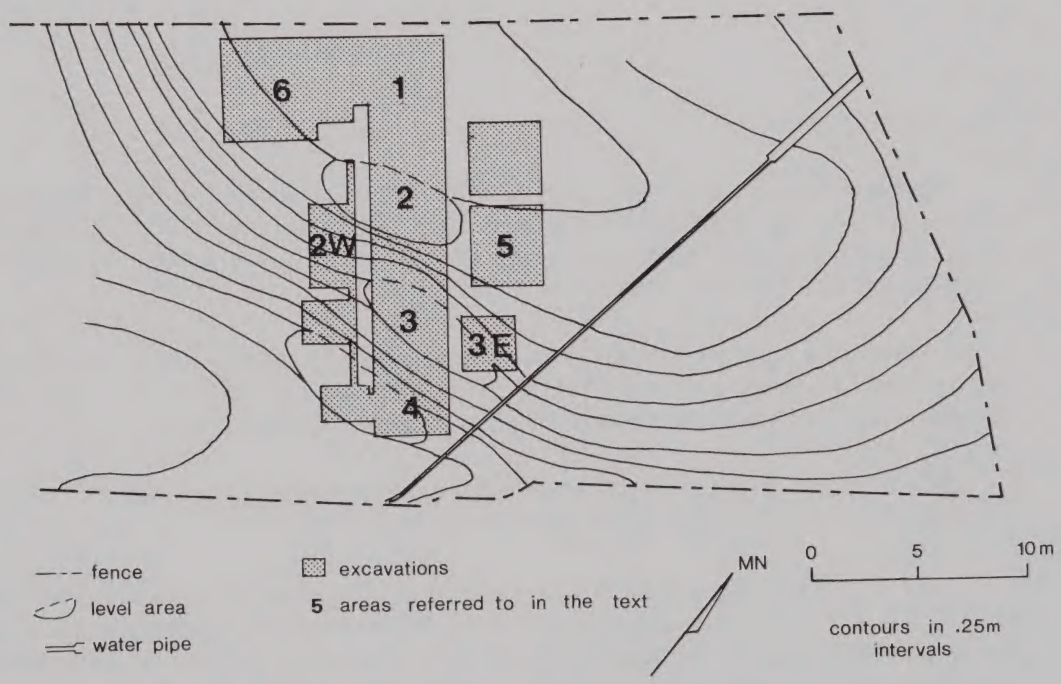


Fig.3. R11/898: the excavations showing site areas referred to in the text.

STRATIGRAPHY

The overall stratigraphy of the site was not complex. The main layers were present over the entire excavated area with localised lenses, particularly of midden, present in different areas (Fig.4).

Layer 1A, the turf zone and topsoil, was a dark brown friable loam up to 100 m in depth. This layer contained recent material including sheep bones, nails, bottle glass and coins.

Layer 1B was similar in texture and colour to Layer 1A. The difference however was in the inclusion of charcoal flecks. This layer was present over all the site with the exception of the steepest part of the slope. There were several variations in the colour, the darker ones being due to staining from charcoal concentrations. Stone and obsidian flakes occurred at the interface of Layers 1A and 1B. Several postholes also occurred at this level, indicating the upper part of Layer 1B was a cultural surface (Occupation II).

Layer 2, the shell midden, occurred in four separate areas (1, 2, 4 and 5) but could only be called a substantial deposit in Area 2 where lensing within the layer was evident. Lens 2A was a thin lens of crushed shell overlying Lens 2B, which was up to 500 mm deep and consisted of whole shells. Lens 2C was limited in extent and consisted of crushed and burnt shell in a matrix of wood ash and charcoal blackened loam. The lens was interpreted as fire rakeout from the cooking area. Lens 2D was sparse shell and bone in a clayey silt loam matrix, similar to Layer 3.

Layer 3, a dark yellowish brown slightly silty clay loam, was the natural subsoil through which basaltic lava protruded. A mottled interface zone containing charcoal fragments was present between Layers 3 and 1B. Artefacts and features could be assigned to this zone. This is termed Occupation I, the first on the site, although the specific sequence of events within this occupation cannot be determined.

Several test pits were dug to examine the natural soil profile on the site. Three distinct horizons were evident.

A. Horizon (topsoil) — a dark brown loam up to 70 mm in depth.

B. Horizon — a brown loamy transitional zone, up to 150 mm deep, between the topsoil and the subsoil.

C. Horizon (subsoil) — a dark yellowish brown silty clay loam which with increasing depth became more clay-like. This was the weathered Otahuhu ash, equating with Layer 3 in the excavations.

STRUCTURAL EVIDENCE

A number of postholes and firescoops, a pit with a drain, and a stone backed fireplace were excavated. The features will be described and discussed by excavation area, as they appear to reflect spatially distinct activities.

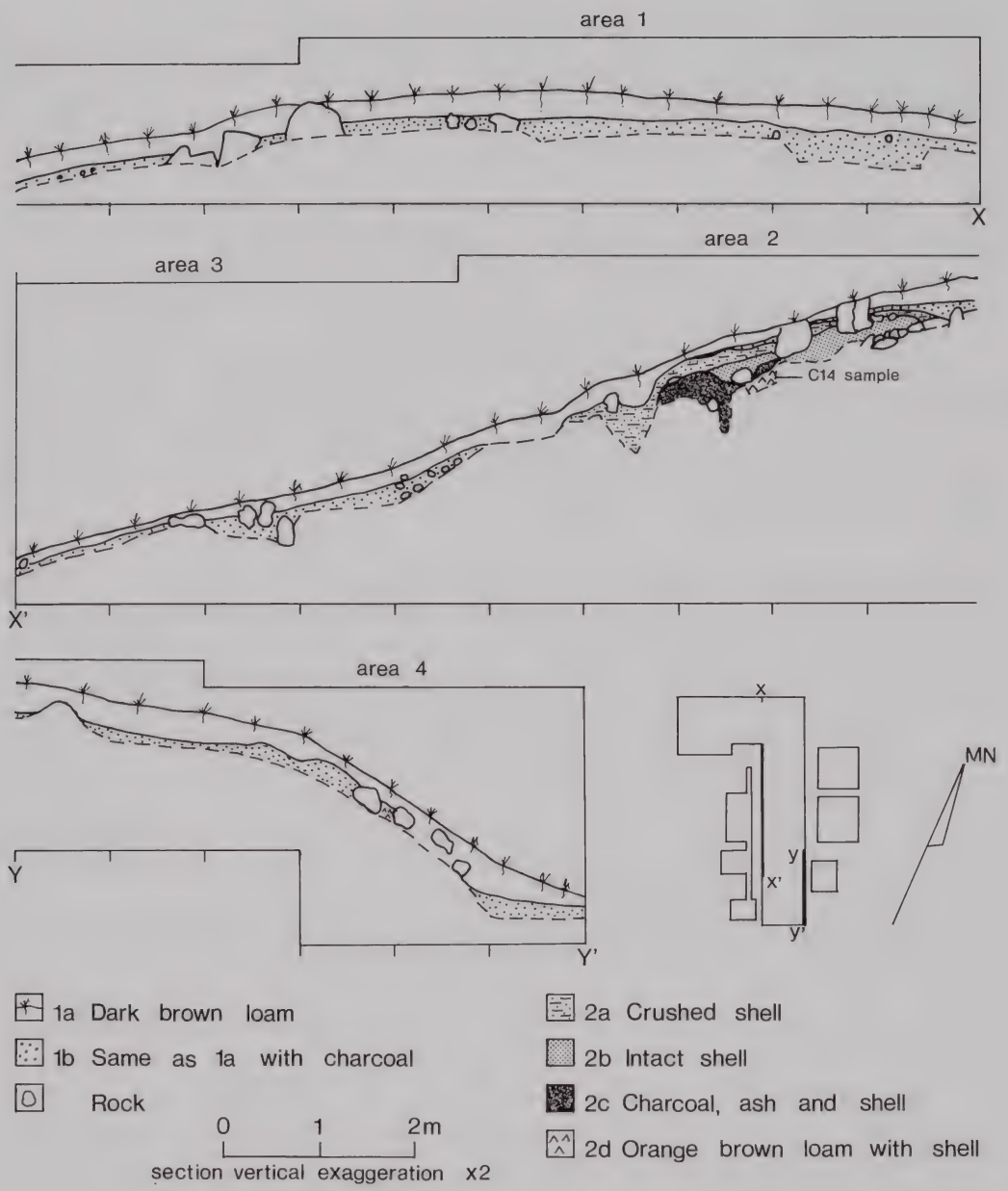


Fig.4. R11/898: cross-section through the site.

Areas 1 and 6 (Fig.5) contained a stone free area within which there were 34 postholes varying in depth from 50 to 340 mm. Several were elongated in shape. All but four of the postholes can be assigned to the earlier occupation of the site, cut from the interface zone between Layers 1B and 3. A pattern to the postholes is not immediately obvious. However from the number of postholes it is apparent several superimposed structures, which continue into the baulk on the northern side, are represented.

One structure can be inferred from a rectangular-shaped feature defined by shallow scarps, and interpreted as the foundation for a small dwelling. The small circular depression filled with stones and charcoal was probably a fireplace or hearth within the structure. Three equally spaced postholes are roughly aligned through the long axis of the feature. Their contemporaneity with the feature was however not established. A plot of the lithic material from the first occupation showed an absence of flakes coinciding with the outline of the feature. This suggests a relationship, and possibly the structure was the last in a succession of buildings in the one place.

Area 1 had few features in comparison to Area 6, probably explained by the stoniness of the subsoil. Shell midden filled a long shallow depression at the base of which were five postholes. These appeared to predate the midden. A firescoop, filled with black loam, charcoal and small cobbles, was adjacent.

The distribution of stone material for Occupations I and II showed a marked change. Within Occupation I the stony part of Area 1 was used to some extent for either flaking or discarding of waste flake material. However there is almost a complete absence of material relating to the earlier occupation in this area. This contrasts strongly with the evidence from the adjacent Area 6 where stone working was an important activity in both occupation periods.

Areas 2, 2/West and 5 (Fig.6) encompassing the uppermost terrace, can be discussed as one unit as the shell midden extended through all three areas.

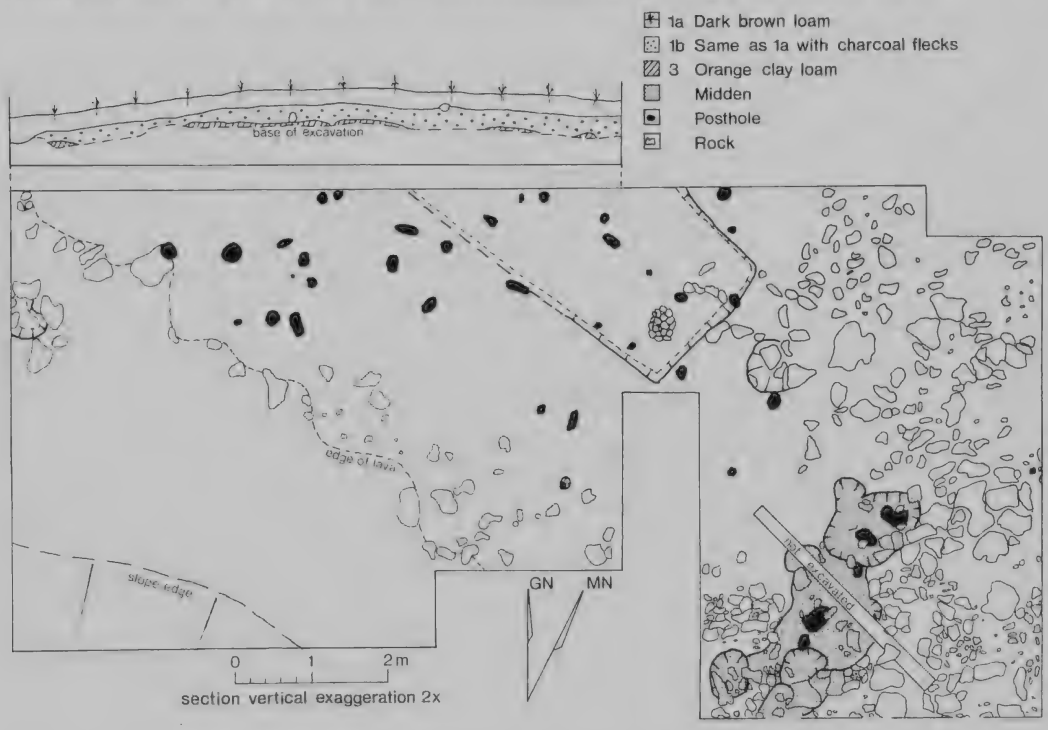


Fig.5. R11/898: plan of excavations, Areas 1 and 6.

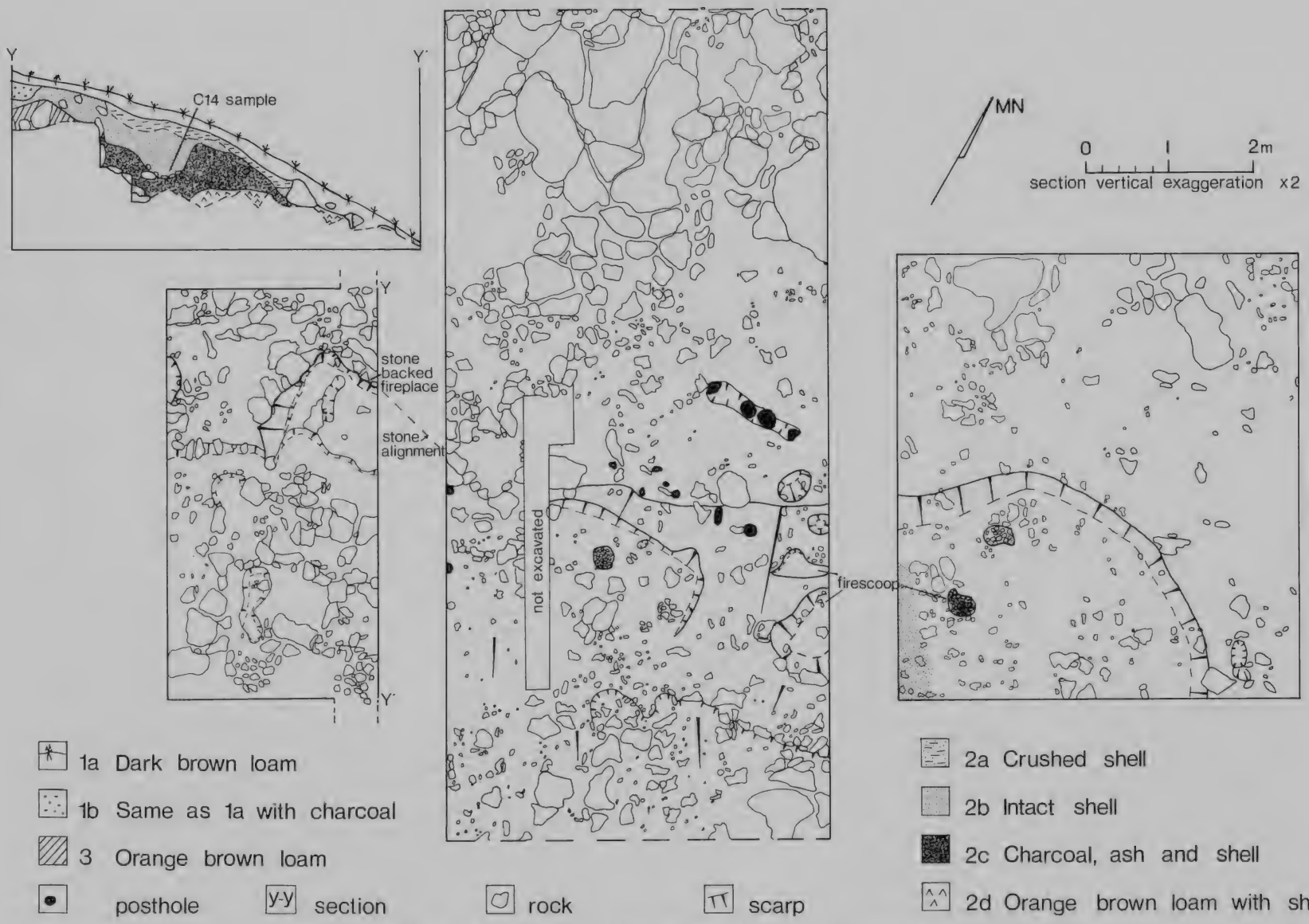


Fig.6. R11/898: plan of excavations, Areas 2, 2/ West and 5.

The original interpretation of the level area as a constructed terrace was incorrect. Lava protruded through Layer 3 in a number of places, indicating its use as a residential terrace was very unlikely. The 'terrace' was natural, probably formed by an undulation or irregularity in the lava.

Layer 1B covered the shell midden where the surface was level but was absent where the slope was steepest. Flakes of obsidian were present at the interface of the topsoil and Layer 1B, and also within the midden. Beneath the lenses of shell, postholes and firescoops were cut into Layer 3.

Several of the postholes, which were up to 200 mm deep, were in a shallow slot. These have been interpreted as part of a windbreak to protect the cooking area from draughts and wind gusts.

In the initial use of this area, the 'terrace' had been modified and a front scarp 300 mm high was formed. This presumably also functioned as a windbreak for the firescoops at the base of the scarp.

Firescoops were of two types: shallow circular depressions filled with small fire-reddened scoria cobbles and charcoal, or a deeper more irregular shaped feature with charcoal pieces and wood ash in the base. The firescoops in the lower level, predating midden deposition, were of the former type while those cut from the surface of the shell midden were of the latter type. This may reflect a difference in cooking techniques or the type of food prepared.

Firescoops with cobbles were also present in Area 5, the easternmost extent of the cooking area. A shallow semicircular-shaped scarp confined the firescoop features.

Covering the firescoops was Lens 2D, a silty loam containing small amounts of shell and bone. Two bone needles and the shell pendant were within this layer.

The cooking activity in the main part of Area 2 seems to have ceased with the deposition of the midden. After Lens 2D was laid down, several stone alignments were placed across the slope and filled in behind with wood ash, crushed shell or concentrations of greasy black loam.

The focus for the cooking activity shifted to Area 2/ West where firescoops and a fireplace backed by a vertical scarp faced with stones were present. The fireplace was stratigraphically later than Lens 2D as a stone alignment, part of the construction of the fireplace, was resting on Lens 2D in the central excavated strip. Lens 2C, a fire rakeout, probably originated from the firescoops. This layer was up to 600 mm deep near the stone backed fireplace but thinned rapidly to be only a few millimetres thick in the main excavation area. Lens 2B, a layer of whole shells, covered the entire area. However firescoops were also cut into Lens 2B in both Area 2/ West and the main Area 2 excavation.

Area 3 had little in the way of features. The excavated strip intersected only the western end of the terrace. The extension, Area 3/East, across the central part of the terrace, had a stone alignment at the back of the terrace which had the function of retaining small stones present on the scarp. Two features, cut into Layer 3, were excavated. One had small stones arranged in a circle around the outer edge of the depression and both contained charcoal and fire reddened cobbles. There was no evidence of postholes, which was not surprising given that bedrock was present immediately below Layer 1B over much of the terrace surface.

Area 4 (Fig.7) at the base of the slope, intersected the lowest terrace. Two postholes, a pit containing a sump and an associated stone filled channel were present. All features can be assigned to the earlier occupation. This terrace differed from the others in that it was cut into naturally re-deposited ash and loam. Layer 1B filled the pit and sealed in the channel, both of which were cut into Layer 3. The pit was, on average, 250-300 mm deep, with an uneven floor surface through which bedrock protruded in several places. The sides and base of the pit were unweathered, suggesting it was not used for any length of time or left open after its usefulness ended. In the southwest corner of the pit, a depression filled with scoria cobbles was interpreted as a drainage sump. The base of the sump was 380mm lower than the floor of the pit. Connected to the sump was a flat bottomed channel, external to the pit, which could be traced across the terrace towards the front edge. The channel was on two levels, with the section closest to the sump being on a lower level relative to the ground surface. The outer section was filled with scoria cobbles. The system, if it was designed for drainage, would not have been very effective and would be more likely to channel water into the sump rather than out of it. It could only act in reverse if the sump filled completely with water, in which case the drain would take the overflow, but once the

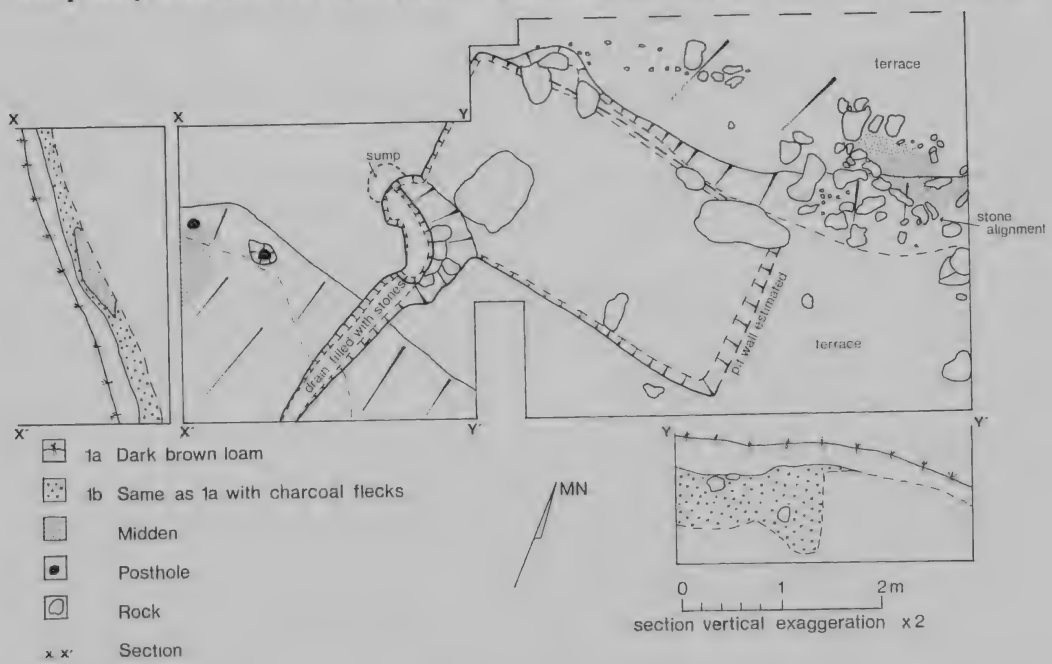


Fig.7. R11/898: plan of excavations, Area 4.

water level dropped below the level of the channel lip, the sump would continue to hold water with no means of escape other than natural percolation through the soil. On the basis of the apparent inefficiency of the channel system to remove water, the pit cannot with any certainty be interpreted as a feature for the storage of vegetables such as kumara.

A stone alignment on the backscarp of the terrace retained a shallow deposit of midden originating from Area 3 above. Two postholes filled with shell midden were present on the western part of the terrace. These did not appear to be related to the pit feature but belonged to the same occupation period.

Discussion of the structural evidence and occupation sequence

In this excavated part of the site the evidence for the earlier occupation is stronger than that for Occupation II.

Housing in Area 6, cooking in Area 2, and stone working over much of the excavated area can be inferred for Occupation I. In addition, the construction of a terrace at the base of the slope and a pit with an elaborate form of drainage can also be assigned to this period. The large number of postholes in Area 6 suggests several structures are represented. On the basis of this evidence, the site may have been occupied for some considerable time within what is termed Occupation I. Some truncation of the ground surface has occurred in Area 6 as stone flakes were found resting directly on the subsoil and the pre-occupation topsoil was absent. In addition, several shallow postholes may originally have been deeper.

Firescoops, a larger more intensively used cooking area and the midden dump in Area 2 are also part of the first occupation. The terrace surface in Area 3 was modified during the earlier occupation and used as a place for stone flaking. The terrace in Area 4 and the pit feature on it were also constructed during this period.

There is less tangible evidence for Occupation II. Lithic material and several postholes are all the evidence there is, suggesting the main part of the settlement is away from the excavated area. It is likely that the focus of activity was on the top of the ridge rather than on the slopes.

RADIOCARBON DATES

Three samples of cockle shell were submitted to the Institute of Nuclear Sciences, DSIR, for radiocarbon dating. The result, given as new half life, are as follows.

NZ6163 from a shell lens in Area 1 produced an age estimate of 332 ± 59 B.P.

NZ 6164 was from Lens 2D, the earliest midden deposit in Area 2, giving a date of 421 ± 59 B.P.

NZ 6165 was from Lens 2B in Area 2/West. The date was 309 ± 59 B.P.

All three samples date activities predating Occupation II for which no dates are available. It appears the site was occupied in the late 16th century and the events the samples date may be assumed to have occurred within a short space of time.

FAUNAL REMAINS

Shellfish

Midden samples were taken during excavation from Areas 1, 2, 4 and 5. Twenty-one species of shellfish were present in the analysed sample, but only seventeen species are likely to have been gathered for their food value. The shellfish were gathered from several ecological zones (estuarine, rocky shore and open coast) indicating a wide range collection of species..

The greatest number of shellfish species were from an estuarine or soft mud environment. *Chione* (*Austrovenus*) *stutchburyi* (cockle) was the dominant species, accounting for over 95% of the shellfish in each sample. *Paphies australis* (pipi) and *Amphibola crenata* (mudsnail) were present in smaller quantities. Other estuarine species present in very small quantities were *Cominella adspersa, Mactra* (*Cyclomactra*) *ovata ovata, Maoricrypta* (*Zeacrypta*) *monoxyla, Zeacumantus lutulentus, Venerupis* (*Paphirus*) *largillierti, Diloma* (*Fractarmilla*) *subrostrata subrostrata, Diplodonta* (*Zemysina*) *striatula, Alcithoe arabica* and *Pecten novaezelandiae.*

Two suitable environments in close proximity to the site are the Tamaki River Estuary, approximately 1 km to the east, and the Manukau Harbour 1.5 km to the west. It is unlikely that species such as *Pecten novaezelandiae* (scallop) were found in the estuary, and they were probably obtained from either the Manukau Harbour or the Waitemata Harbour.

The rocky shore species were also more likely to be from further afield in the Manukau Harbour or the Waitemata Harbour. Species in the midden samples were *Turbo smaragdus, Crassostrea glomerata, Haustrum haustorium, Haliotis* (*Paua*) *iris, Perna canaliculus* and *Maoricolpus roseus roseus.* Paua in particular is not suited to an intertidal zone and is therefore more likely to have been found near the Manukau Heads. The remaining rocky shore species occur in the intertidal zone.

Paphies (*Mesodesma*) *subtriangulata subtriangulata, Dosinia* (*Phacosoma*) *subrosea* and *Dosinia* (*Austrodosinia*) *anus*, all species suited to an open environment such as that found in shallow water off coastal beaches, were also present. The nearest places to the site for these conditions would be Takapuna Beach or the northern side of the near islands of the Hauraki Gulf, such as Motuihe (Morton & Miller 1973).

Bone

The bone material was found predominantly in the midden in Area 2. *Canis familiaris* (dog), *Rattus exulans* (rat), fishbone and birdbone were present.

The dog bone was fragmented but a wide range of skeletal parts are represented. At least two, and probably three, individuals are present. This minimum number is derived from the presence of four pelvic fragments which include the femur socket.

Although lefts and rights are equally represented, if matched for size there are almost certainly three individuals. One juvenile is present, indicated by three small thoracic vertebrae and by a tarsal which is noticeably smaller than the others present.

At least nine rats are estimated from counting right femurs and a number of other body parts were present.

Two identifiable species of fish were present — *Chrysophrys auratus* (snapper) and *Thyrsites atun* (barracouta). Minimum numbers of individuals for each species are estimated from the head bones. At least eighteen snapper are represented ranging in size 250-700 mm. Three barracouta were present. Several vertebrae of a small cartilaginous fish were also identified.

A small amount of birdbone was present. This was mainly in the form of undiagnostic shaft fragments.

Landsnails

Several species of landsnails were present in the midden samples. Two species (*Mocella* sp. and *Charopa* (*Egustula*) *egesta*) sensitive to a drying out of the local environment indicate some bush or rotting logs were on, or very near to, the site. The presence of these sensitive species precludes scrub or bracken fern vegetation near the site at the time of midden deposition. Other species (*Phenocohelix giveni, Phenocohelix ponsonbyi, Carellia* sp., *Mocella eta* and *Punctid* sp.) are more tolerant to changes in the local environment.

ARTEFACTS

A large number of artefacts of various types were recovered from the site. In addition, an extensive assemblage of stone flakes including obsidian, chert, greywacke and argillite was present. The artefacts demonstrate a number of activities were being carried out on the site and a wide range of raw materials were used: bone, shell, greenstone, stone of various types, baked clay and basaltic scoria.

The greatest variety of artefact types comes from Occupation I: a shell pendant, two bone needles and approximately half the adzes, obsidian and stone flakes. The recovery of such a large number of artefacts from an Auckland site of this age is unusual, matched only by two other excavated sites, R10/31 on Motutapu Island (Leahy 1970) and R11/96 Taylor's Hill (Davidson pers. comm.).

Adzes

Five adzes or roughouts, and pieces of six other adzes, were excavated. Two greenstone chisels completed the assemblage. All of the adzes are of a rock type commonly referred to as greywacke although those in a fine grained greywacke, or siltstone, have been tentatively sourced to the Port Waikato area, as opposed to the Hunua/Hauraki area.

Only one complete adze, made of fine grained greywacke, is highly finished, having approximately 75% of its surface ground (Fig.8). There is a slight bevel, triangular in shape,and the chin is skewed to one side. One other adze (Fig.13), the butt end of which is missing, shows the same degree of finish. The stone material is also a fine grained greywacke.

In general shape and cross-section the remaining adzes and roughouts follow the local adze type described by Davidson (1982:44) which tends to be less regular in form and finish than adzes from outside the Auckland area. The cross-sections are asymmetrical or rough rectangular. Materials used on this site reinforce the notion of a local manufacturing of the artefacts as the stone sources are within a 100 km radius of the site.

Two complete adzes (Figs.9, 10) have no evidence of hammerdressing but show partial polishing and flake scars. The rock material, with a greenish colour, is similar to the greywackes found on islands in the Hauraki Gulf. The small adze (Fig.10) has grinding on front and back surface. The straight blade shows signs of much use with flakes removed and blunting of the edge. In contrast, the adze illustrated in Fig.9 has been partially ground on the back. Made on a flake, the striking platform and positive bulb of percussion are evident on the front. The straight blade is very blunt and is probably not finished.

Greywacke boulders have been used as a raw material in adze manufacture. A roughout (Fig.11) shows evidence of the cortex on one side. Hammerdressing is evident on the front and sides, particularly in the area of the incipient bevel. The artefact requires blade and bevel formation in addition to polishing.

Pieces of six other roughouts or broken adzes were found. While most of the adzes and roughouts have a cross-section which is irregular in shape, two pieces stand out as being different. A quadrangular cross-section is evident on one roughout piece (Fig.12) which is hammerdressed over much of the surface. One large flake has been removed from the blade area. The butt has broken off. The second anomaly, represented by a blade, was made on a flake struck off a water worn boulder. The sides have been flaked and lightly hammerdressed. The cross-section is rounded triangular in shape and differs from the remainder of the adze forms on the site. The stone material is a light grey fine-grained greywacke.

Greenstone Chisels

Two greenstone chisels (Figs.14, 15) were found in Area 6 at the top of the slope. The larger chisel has a curved blade from which several small chips have been removed (Fig.14). The other chisel (Fig.15), although damaged at the poll end, has the remnants of a bevel. This suggests the chisel was reworked to produce a cutting edge at the other end.

Figs. 8-13. Adzes from R11/898.

Bone Needles

Two bone needles were found in the midden area. One needle, 44 mm in length, is complete and has a slight curve at the point end. The second needle has no point, and is thicker. The eye in both needles has been formed by a sawing technique rather than the usual drilling method associated with needles from North Island sites (Davidson 1984:74). In addition, a notch is present in the end of each needle above the eye. The small size of the needles, and the thread holes in particular, suggest fine sewing of garments was being carried out on the site.

Shell Pendant

A pendant fashioned from a dog cockle (*Glycymeris laticostata*) shell (Fig.16) was found near the bone needles in Lens 2D. The radial ribs of the shell have been ground down to a smooth surface but the pattern remains. This however did not form part of the visible decoration as the plain side was worn uppermost. This is demonstrated clearly by the wear and use-polish present on the patterned side. Two drilled holes enabled attachment to a neck cord. Both holes are broken out on the sides, and a central hole was started from the back but not completed.

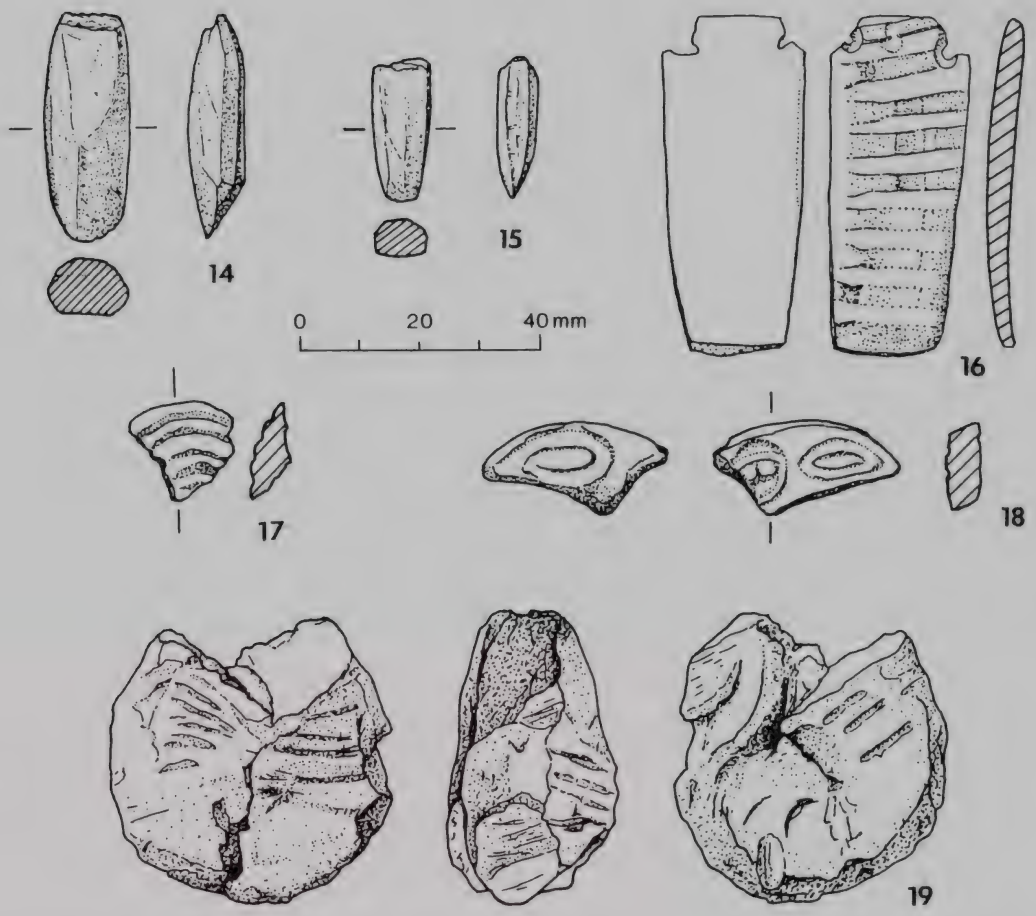
Several pendants of a similar form are present in museum collections and have been termed "rei-puta-like" on account of the reduction in width towards the lower end and the slight outward curve (Furey 1986). The pendant from this site is however flat in profile but displays many similarities to the other known pendants of this type.

Baked Clay

Two pieces of decorated clay were also present. One (Fig.17) is a segment of a larger object and has curved incised lines, part of a circular or spiral pattern. The other piece (Fig.18), is also incomplete but in shape resembles half a crescent. The incised decorations on the front and back surfaces are ovoid, and the upper and lower edges have been flattened and smoothed. The clay from which these objects were made is of a fine texture and whitish in colour (as opposed to the local red or orange clays). This type of clay is not found in the Auckland area, and is possibly from the vicinity of Port Waikato (pers. comm., geologist, Western Potteries after a visual examination of the pieces).

It is likely the pieces were incised before firing, merely because of the apparent control over the designs and because it would be easier to execute the decoration on a softer pre-baked material. However it is difficult to be quite certain about this.

A roughly circular object with grooves on the top is also made from clay (Fig.19). It has been formed by coiling a roll of wet clay and pressing the edges together to form a join. The sides have been flattened. A partial finger print and two crescent shaped fingernail impressions are present on the underside. The width of the grooves, which radiate out from the centre of the object on the upper side, are consistent with the width of a bone needle and it is suggested the object was used for shaping or sharpening bone needles. Identification of the material by x-ray diffraction showed it



Figs.14-19. Artefacts from R11/898. 14,15. Adzes. 16. Shell pendant. 17-19. Clay pieces.

to be clay, consistent with having been fired at greater than 600° C (R. Brash, geologist, pers. comm.).

The presence of baked clay is not unique to this site. Decorated clay pieces have also been found in excavations on Hamlin's Hill.

Hammerstones

Four hammerstones were found, the largest of which weighed 1.36 kg. Three were found in Area 3. This correlates with the waste stone chips and adze flakes to suggest maintenance work on adzes was being carried out there.

Burnishers

Several pebbles with polished surfaces were collected. It is likely these were used as burnishers or rubbers. The porcellanite pieces were also possibly used as burnishers.

Miscellaneous

Other artefacts recovered include a fishing net sinker fashioned from a scoria bomb, and part of a bone fishhook shank and base which has been burnt. This specimen is part of a two-piece oval lapped small hook as described by Crosby (1966:192). The broken butt of an adze appears to have been reshaped by the removal of flakes to form a triangular shaped point or awl. The point itself is absent but the artefact was probably used for drilling holes in wood.

Obsidian flakes

A total of 626 pieces of obsidian were recovered, representing 52% of the lithic material. Of these, 23% were not included in the analysis, having a maximum dimension of less than 10 mm. Forty-three cores were recovered. Generally the flakes were small, and the utilised edges very small, suggesting use for a specialised activity. Within the utilised flakes, 86% had working edges less than 10 mm in length, and 64% were less than 6 mm. Edge damage on flakes took the form of "nibbling", or the presence of tiny uniform flake scars. The majority of the utilised flakes (72%) had unifacial edge damage caused by using the tool in a scraping motion. Retouch, to blunten an edge other than the working edge, was present on 14% of the utilised flakes.

While there were no formal tool types present, 6% of the pieces were long and narrow with a straight chisel-like working edge. All but one was assigned to Occupation I. Two examples had damage on the sides, possibly caused by a haft.

Both green and grey obsidian was present. Overall green obsidian made up 26% of the assemblage. Within Occupation I, 31% of the obsidian was green, reducing to 21% in the second occupation (Table 1). The obsidian has not been source analysed. However, the green flakes are probably from Mayor Island and the grey obsidian is likely to be from several sources. The distribution of obsidian was variable within the site. Area 6 had the largest number of both periods of occupation (Table 2). Area 5, lower on the slope, also had a high number. Both areas had a large proportion of utilised edges.

Table 1. Obsidian Type by Occupation.

	Total No.	Green	Grey	% Total Utilised
Occup. II Layer 1	136	29	107	27
Occup. I Layer 2	42	13	29	7
Layer 3	302	93	209	65
	480	135	345	

Table 2. Distribution of obsidian by Area and Occupation.

	Area	Total No.	Green	Grey	% Total Utilised per Occ.	% Flakes Utilised in Area
Occup. I	1	28	6	22	9	53
	2	60	16	44	15	40
	3	80	27	53	22	45
	4	10	4	6	2	40
	5	70	21	49	18	38
	6	96	32	64	33	56
		344	106	238		
Occup. II	1	5	1	4	5	60
	2	2	—	2	—	—
	3	16	3	13	2	6
	4	—	—	—	—	—
	5	22	7	15	27	77
	6	91	18	73	66	45
		136	29	107		

Stone Flakes

There were a number of similarities between obsidian and other stone materials. In total 582 flakes and cores were used in the analysis, with a further 72 pieces (11% of the total) being too small to have been used as tools. Over half of these small waste flakes came from Area 6 and all but two of the remainder were from Area 3.

Usewear damage was found on 21% of the pieces. Greywacke accounted for 64% of the used flakes and chert for another 24%. Occupation I had 65% of the utilised flakes. With the exception of three chert cores, usewear occurred on flakes, several of which had flecks of kokowai adherring to the working edge. Unifacial edge modification is present in 79% of the utilised chert flakes and 71% of the greywacke flakes. Blunting was also included as a category of usewear as 13% of the chert, and 21% of the greywacke flakes had a blunt working edge. On over half of the flakes the length of working edge was less than 6 mm. This compared very favourably with a similar analysis of the obsidian. Again, like the obsidian, the majority of the utilised flakes are from Area 6.

Fifty-three polished adze flakes were recovered with 85% from Occupation I. In Occupation I, 24% of the adze flakes were from Area 6 and more than half of these had been re-used. Overall, the adze flakes came from Areas 2, 3 and 6. The latter two areas also accounted for almost all the small unanalysed flakes.

The stone materials used on the site were all from the Auckland region. Greywacke outcrops occur on the islands in the inner Hauraki Gulf while the chert is likely to be from a Coromandel source. Other materials present in small quantities were argillite, probably from the Hunua Ranges, quartz, sandy greywacke and a local porcellanite, formed by clay baking on contact with hot lava (Searle 1981:55).

Discussion of stone material

The distribution of the lithic material indicates clearly that there are areas of stoneworking and stone using activity on the site. In a comparison of percentages for different variables between obsidian and other stone material, it can be seen that there are a number of similarities. Both have a similar percentage of flakes with unifacial usewear damage and with a straight working edge. In addition, in each case 63% of utilised flakes have working edges less than 6 mm in length. This suggests that flakes of obsidian and other stone materials were being used in similar ways.

In Occupation I, Area 3 was an area where polished adzes were reshaped after being damaged. The butt end of a roughout was also found at the same level.

Area 6, in both periods of occupation, was where stone and obsidian flakes were used. Sewell (in Furey MS) has suggested that the small size of the tools and length of working edge, combined with unifacial edge damage, indicates the flakes were being used for an activity requiring a degree of control. This was possibly scraping or carving of wood. The presence of two greenstone chisels in Area 6 would tend to support this interpretation.

DISCUSSION

Excavations in a very small part of the overall site uncovered postholes, a cooking area and shell dump, stone working areas and a pit feature with an associated drainage system. The site may be interpreted as an undefended settlement where a number of activities took place.

From the evidence, it appears there may have been functionally discrete areas giving rise to an internal organisation of the settlement. Postholes show re-use of one area for a similar purpose. Similarly cooking, and dumping of shell waste, was confined to one part of the site.

It is likely that Area 6 contained some of the dwellings of the settlement in the first occupation, but the evidence for individual structures is far from clear. As an example, a house or shelter is inferred from a slightly sunken rectangular feature. However the posthole evidence to support this interpretation is less tangible. The estimated dimensions of the foundations fit within the size range of 1.5-2:1 length to width ratio, which Prickett (1982:119) arrived at from an examination of the ethnographic literature.

Two periods of use on the site are recognised. However, several re-occupations, perhaps on a seasonal basis may be represented by what has been termed Occupation I. The radiocarbon age estimates do show some variability although the order of dates is stratigraphically correct. The later occupation is represented by little evidence suggesting the excavated area was peripheral to the main part of the settlement.

The excavation of the three levelled areas on the slope, initially recorded as terraces, illustrated the difficulties in assigning functions to features visible on the surface. The uppermost level area, contained in Area 2, proved, on excavation, to be a natural feature. It is unlikely, given the uneven surface, that it was a living surface, although the terracette was modified by the construction of fireplaces, and later built up by the dumping of shell midden. The second level area, in Area 3, was more convincing as a constructed feature, although it is likely that this too was a natural feature which had been modified. The backscarp of the terrace in Area 3/East had been excavated or steepened. The lower level surface, in Area 4, does appear to have been a constructed terrace. Erosion and redeposition of the Otahuhu ash and Layer 3 at the base of the slope provided conditions more suitable for the construction of a terrace. Thus the Maori use of particular areas within the site can be explained in part by the geology and geomorphological history of the locality.

A diverse range of artefacts were found on the site. The presence of adzes and roughouts, together with stone flakes, polished adze flakes and hammerstones, suggests adze manufacture was an activity being carried out. The majority of the roughouts were hammerdressed but still required blade and bevel formation. The greenstone chisels and usewear on obsidian flakes suggest woodworking or wood carving was also being carried out.

The number and types of artefacts and the activities they represent suggest the site was not a short-term encampment within the gardens. Rather, the evidence indicates a settlement intended for longer duration where maintenance activities were carried out and there was time for projects, for example carving, not normally associated with temporary camps.

A review of the Maori traditional accounts and evidence placed before the Land Courts gives some insight into the settlement pattern of the Otahuhu area in the sixteenth and seventeenth century. A long association with the area may be inferred from the Tainui canoe traditions which in their various forms relate the hauling of the Tainui canoe across the portage from the Tamaki River to the Manukau Harbour. Several places in the general area have names related to this event (Simmons 1980).

Traditions also describe the settlement of the Otahuhu area by Tahuhu, who built a pa called Otahuhu. Kelly (1949:455) suggests this occurred in the 15th century. Ngai Tahuhu are mentioned in later traditions, probably attributable to about the mid-17th century, when they occupied "Otahuhu and several adjoining pas" (Graham MS.:6). Sullivan (MS.:11) suggests each pa housed a subdivision of the larger Tahuhu hapu, and Te Apunga-o-Tainui, on the basis of close proximity to Otahuhu, may have been one of the pa. Extending the argument further, she suggests Hamlin's Hill although

not visibly a defended site, may also be one of the pa alluded to. Davidson (1970:120) in interpreting the excavated part of Hamlin's Hill as an undefended site, does not discount the possibility of the upper part of the site being fortified at one time.

The settlement pattern of the Otahuhu area was probably influenced to some degree by the portages. The attraction of a narrow land mass which would allow people and canoes to be moved relatively easily between east and west coasts does not need to be stressed. The portages would therefore have been subjected to use by groups with aggressive as well as peaceful intentions. This was particularly so in the early 19th century when the main portage was used by Ngapuhi during their expeditions into the Waikato (Sullivan MS.:18-19). During such episodes it would have been expedient for the occupants of the Otahuhu area to move into the pa or make themselves scarce. Departure may in some instances have been hasty, leaving houses and gardens unattended until the threat had passed.

While pa were the settlement focus in times of stress, during more peaceful intervals people dispersed out to be closer to the gardens and set up home bases and temporary camps to gather food and other resources. R11/898 and Hamlin's Hill, together with several other open settlement sites in the vicinity can be interpreted in this way. It is likely also that radiocarbon dates from Westfield and Hamlin's Hill may provide a chronology, in broad terms, for settlement of the cone pa of Te Apunga-o-tainui and Otahuhu.

Open settlement sites are an important part of the settlement pattern, although often neglected archaeologically. Within the Tamaki isthmus, open settlement sites have had a low survival rate because of land development and urban encroachment. The excavations of open settlements on the Tamaki isthmus have all been carried out in response to development pressure. Hamlin's Hill, Alberon Park in Parnell (R11/120, Law 1970) and Westfield fit this category. Two other sites in the Otahuhu area, Hawkin's Hill (R11/1394) and Fisher Road (R11/899), have been investigated recently but are not yet reported on. Motutapu Island, in the Hauraki Gulf, also has had several excavations carried out on open settlement sites. Here, open settlement sites outnumber pa by 27:1 (Davidson 1978:329) which gives some indication of the number of undefended sites which might be expected to have been present on the landscape in the Tamaki isthmus.

Two radiocarbon dates are available from Hamlin's Hill. NZ 5962, with a date of 427 $\pm$ 77 B.P. (new half life), was on charcoal from short-lived species. The second sample, NZ 6156, of pipi shells, gave a date of 340 $\pm$ 45 B.P. Occupation of the site was interpreted as occurring sometime between A.D.1400-1700 (Pearce & Walton 1983). The dates from Westfield and Hamlin's Hill are similar and the sites may have been occupied close within the same general time range. This view is reinforced when other details from the sites are compared.

Hamlin's Hill had houses enclosed by fences, storage pits, stone covered drains and cooking areas which provided a comprehensive picture of the layout of an undefended site. The site, excavated over a number of years (Davidson 1970, Irwin 1975, Nichol 1980, Pearce 1975, Walton 1979), opened up a larger area than that on

any other open settlement site in the Auckland area. The excavation at Westfield indicated there was also an internal layout to the settlement, with areas set aside for specific activities. Each site appears to have had houses or structures of a similar construction. Elongated postholes, similar to those on Westfield, have on Hamlin's Hill been interpreted as holding house posts or slabs, with sections of wall of a lighter construction in between (Davidson 1970:116, Irwin 1975:82). Artefacts of baked clay, found on both sites, and not recovered from other sites in the Auckland area, also suggests a relationship. Finally, both sites are similar in age.

CONCLUSION

From the limited excavation at R11/898, the evidence suggests the site was more than a temporary camp within the garden areas. Activities such as adze manufacture and woodworking are more likely to be carried out at base camps. The presence of storage pits visible on the surface reinforces this idea.

Excavation of the site has contributed to an understanding of the settlement pattern in the Otahuhu area. The assemblage of artefacts provides a unique collection from an undefended site dated to the late-16th century.

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